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ABSTRACTS

Edited by DAVID E. ZITARELLI

The purpose of this department is to give sufficient information about the subject matter of each publication to enable users to decide whether to read it. It is our intention to cover all books, articles, and other materials in the field.

Books for abstracting and eventual review should be sent to this department. Materials should be sent to Prof. David E. Zitarelli, Department of Mathematics, Temple University, Philadelphia, PA 19122, U.S.A. (e-mail: ZIT@VM.TEMPLE.EDU)

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In order to facilitate reference and indexing, entries are given abstract numbers which appear at the end following the symbol #. A triple numbering system is used: the first number indicates the volume, the second the issue number, and the third the sequential number within that issue. For example, the abstracts for Volume 20, Number 1, are numbered: 20.1.1, 20.1.2, 20.1.3, etc.

For reviews and abstracts published in Volumes 1 through 13 there are an *author index* in Volume 13, Number 4, and a *subject index* in Volume 14, Number 1.

The initials in parentheses at the end of an entry indicate the abstractor. In this issue there are abstracts by Victor Albis (Bogotá), Joe Albree (Montgomery, AL), Irving Anellis (Ames, IA), Thomas L. Bartlow (Villanova, PA), Ronald Calinger (Washington), John G. Fauvel (Milton Keynes), Ivor Grattan-Guinness (Middlesex), Jan P. Hogendijk (Utrecht), Victor J. Katz (Washington), Albert C. Lewis (Hamilton), Laura Nurzia (Rome), Karen V. H. Parshall (Charlottesville), James V. Rauff (Decatur, IL), and David E. Zitarelli.

ABELES, FRANCINE F. Algorithms and Mechanical Processes in the Work of Charles L. Dodgson, in *Proceedings of the Second International Lewis Carroll Conference,* Ed. Charlie Lovett, Winston-Salem, NC: Lewis Carroll Society of North America, 1994, pp. 97–106. Descriptions of algorithms developed by Dodgson in cryptography, puzzles, determinants, and logic with an aim toward solutions using mechanical processes. (DEZ) #23.1.1

ALBORN, TIMOTHY. A Calculating Profession: Victorian Actuaries Among the Statisticians, *Science in Context* **7** (1994), 433–468. Actuaries worked hard in the 1820s to forge an alliance with scientists such as Babbage and De Morgan, only to realize subsequently that they needed to distance themselves from certain of the "scientific" values that had informed their collective identity. (JGF) #23.1.2

ALEXANDERSON, GERALD L., AND MUGLER, DALE H. *Lion Hunting and Other Mathematical Pursuits: A Collection of Mathematics, Verse, and Stories by Ralph P. Boas, Jr.,* Washington, DC: The Mathematical Association of America, 1995, xii + 308 pp., paperbound, $35. A tribute to the analyst Ralph Boas that includes some biographical and bibliographical information. (DEZ) #23.1.3

ANDERSON, K. G. Poincaré's Discovery of Homoclinic Points, *Archive for History of Exact Sciences* **48** (1994), 133–147. Poincaré's most radical break with prevailing conceptions of dynamical systems was his discovery of homoclinic points, which now figure prominently in studies of chaotic motion. He first encountered them in connection with his work on the three-body problem, for reasons which are clear from documents at the Mittag-Leffler Institute. (JGF) #23.1.4

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ANELLIS, IRVING. Christopher John Ash, *Modern Logic* **5** (1995), 337. Obituary of the logician C. J. Ash. (DEZ) #23.1.5

ANELLIS, IRVING. Hao Wang (1921–1995), *Modern Logic* **5** (1995), 329–337. Obituary of "a gifted mathematical logician," Hao Wang, with a partial list of his writings. Wang, a confidant of Kurt Gödel, is also known by the more traditional Chinese form of his name, Wang Hao. (DEZ) #23.1.6

ANELLIS, IRVING. John Vincent Atanasoff (1903–1995), *Modern Logic* **5** (1995), 337–338. Obituary of the logician J. V. Atanasoff. (DEZ) #23.1.7

ANELLIS, IRVING. Peirce Rustled, Russell Pierced: How Charles Peirce and Bertrand Russell Viewed Each Other's Work in Logic, and an Assessment of Russell's Accuracy and Rôle in the Historiography of Logic, *Modern Logic* **5** (1995), 270–329. A report on the question of why Bertrand Russell gave such little attention and assigned such little importance to the algebraic tradition of logic represented by Peirce and Schröder. The author concludes that Russell deliberately and consistently undervalued the work of the algebraic logicians in public while privately admitting their positive value. The paper indicates that Peirce held little esteem for Russell's work, regarding him as mathematically unsophisticated. It calls for a continued reevaluation of the relative impact of the work of Peirce and Russell on the development of mathematical logic. (JVR) #23.1.8

ANELLIS, IRVING. Raphael Mitchell Robinson (1911–1995), *Modern Logic* **5** (1995), 329. Obituary of the logician R. M. Robinson. (DEZ) #23.1.9

ANGELELLI, IGNACIO. Saccheri's Postulate, *Vivarium* **33** (1995), 98–111. Girolamo Saccheri in his *Logica demonstriva* of 1697 postulated the existence of various types of variables. This paper describes the postulate's significance for Saccheri's Aristotelian logic and for modern logic, mentions its role in his *Euclides vindicatus,* and cites George Bruce Halsted on the topic. (ACL) #23.1.10

ANON. *Resúmenes/Abstracts/Resumoẽs/Résumés, IV Congreso latinoamericano de historia de las ciencias y la tecnologia,* Cali: Universidad del Valle, 1995, 133 pp. Abstracts of the 4th CLAHT held in Cali, Colombia, in 1995. (VA) #23.1.11

ANON. *Memorias del IV Coloquio internacional de filosofía e historia de las matemáticas y i Coloquio colombiano de historia, filosofía y pedagogía de las matemáticas* [*Proceedings of the International Colloquium on the Philosophy and History of Mathematics and the First Colombian Colloquium on the History, Philosophy, and Pedagogy of Mathematics*], *Ideas y Valores* 92–93 (1993). Proceedings of an event organized in 1993 by the Sociedad Colombiana de Matemáticas, the Asociación para la Historia, Filosofía y Pedagogía de las Matemáticas, and the Departments of Mathematics, Statistics, and Philosophy at the National University of Colombia. The papers are published in this special issue of *Ideas y Valores;* those that are of historical interest are abstracted separately here. (VA) #23.1.12

ARANGO SOTO, DIANA. *La ilustración en las universidades y colegios mayores de Santafé, Quito y Caracas* [*The Enlightenment in Santafé, Quito, and Caracas Universities and Colleges*], Santafé de Bogotá: Universidad Pedagógica Nacional, 1994, 386 pp. A bibliographical study of aspects of the new philosophy in the Viceroyalty of New Grenada. (VA) #23.1.13

ARTMANN, BENNO. A Proof for Theodorus' Theorem by Drawing Diagrams, *Journal of Geometry* **49** (1993), 3–35. (RC) #23.1.14

ASHWORTH, WILLIAM J. The Calculating Eye: Baily, Herschel, Babbage and the Business of Astronomy, *British Journal for the History of Science* **27** (1994), 409–441. The style of astronomical practice was an important factor in the emergence of what might be called an accountants' view of the world. In "business astronomers," such as the founders of the Astronomical Society in London, astronomical calculation furnished the means to monitor and control the accumulation of both intellectual and financial capital. (JGF) #23.1.15

BARBIN, E. *See* #23.1.38.

BARDELLI, FABIO. On the Origins of the Concept of Irregularity of an Algebraic Surface, pp. 11–26 in #23.1.31. Describes a thread of algebraic geometric research from Alfred Clebsch's work in 1868 on double integrals of algebraic differential forms defined over an algebraic surface to Arthur Cayley's formulas for genus $p_g(S)$ of 1871 to Max Noether's corrections of Cayley's work in 1875 through the introduction of the notion of the arithmetic genus $p_n(S)$. Noether showed that $p_g \geq p_n$, which led to an examination of the irregularity $p_g(S) - p_n(S)$ of the surface S. After a brief treatment of French contributions to this study, the work of the Italians, Castelnuovo, Enriques, and Severi in the two decades around 1900 is examined. (KVHP) #23.1.16

BARROW-GREEN, JUNE. Oscar II's Prize Competition and the Error in Poincaré's Memoir on the Three Body Problem, *Archive for History of Exact Sciences* **48** (1994), 107–131. Only weeks before his prize-winning memoir was due to be published, Poincaré discovered an error of such consequence that he had to make substantial changes, discovering homoclinic points in the process. Thus the paper which provided the foundations for his work on celestial mechanics and first described chaotic behavior is remarkably different from the flawed essay which had won the prize in 1889. (JGF) #23.1.17

BARTOL, WICTOR; ORŁOWSKA, EWA; AND SKOWRON, ANDRZEJ. Helena Rasiowa, 1917–1994, *Modern Logic* **5** (1995), 231–247. A personal biography of Helena Rasiowa that reviews her work in algebraic logic and the mathematical foundations of computer science. It also summarizes her professional contributions to the dissemination of logical research. The bibliography includes 97 works by Rasiowa. (JVR) #23.1.18

BEHBOUD, ALI. Greek Geometrical Analysis, *Centaurus* **37** (1994), 52–86. A model of geometrical analysis based on a systematic study of all extant analyses in Book 7 of Pappus' *Collection* helps us to clarify the structure of analysis and to understand the precise sense in which synthesis is the "reversal" of analysis. (JGF) #23.1.19

BELL, JOHN GREGORY. A History of Mathematics Class for Middle School Teachers, D. A. dissertation, Illinois State University, 1992, 693 pp. Description of a course for students in grades 5 through 12 that assumes one year of high school geometry and two years of high school algebra. The course emphasizes the history of the material that is included in the middle school mathematics curriculum, including number systems, computation, number theory, algebra, geometry, probability, and statistics. Dissertation Abstracts International A 53/07, p. 2283, Jan. 1993. (ACL) #23.1.20

BENÍTEZ, LAURA, AND ROBLES, JOSÉ A. Ralph Cudworth (1617–1688) sobre la infinitud de Dios [Ralph Cudworth (1617–1688) on the Infinity of God], *Mathesis* (*México*) **10** (1994), 129–152. A study of Cudworth's arguments on the infinity of God in his work *The True Intellectual System of the Universe*. (VA) #23.1.21

BOCKSTAELE, PAUL. A Challenge to the Mathematicians of the University of Leuven as a New Year's Gift for 1639, pp. 15–27 in #23.1.59. Facsimile and translation of an anonymous pamphlet challenging the mathematicians of Leuven University with three algebraic problems. The first problem concerns the *Methodus polygonorum* of Adrianus van Roomen. Bockstaele discusses several possible authors of the pamphlet. (JPH) #23.1.22

BORGATO, MARIA TERESA. On the History of Mathematics in Italy before Political Unification, *Archives internationales d'histoire des sciences* **42** (1992), 121–136. The rapid development of Italian studies on the history of mathematics after the 1860s grew out of a long tradition of biographical and bibliographical research dating from the Renaissance and before. (JGF) #23.1.23

BOROWCZYK, J. *See* #23.1.38.

BOS, HENK J. M. Johann Molther's *Problema deliacum,* 1619, pp. 29–46 in #23.1.59. Analysis of a book, published in 1619 in Frankfurt, on the construction of two mean proportionals between two given lines by means of a neusis-construction. (JPH) #23.1.24

BOTTAZZINI, UMBERTO. On the Historiography of Mathematics in Italy, 1860–1940: An Overview, *Archives internationales d'histoire des sciences* **42** (1992), 137–144. The major contribution in the first half of the 20th century was due to Loria, Bortolotti, and others whose conception of mathematical development was a kind of geometrical continuation of steadily accumulating results. (JGF) #23.1.25

BRABENEC, ROBERT L. Historical Development of the Foundations of Mathematics: Course Description, *Science & Education* **3** (1994), 295–309. (RC) #23.1.26

BRACKENRIDGE, J. BRUCE. The Locke/Newton Manuscripts Revisited: Conjugates, Curvatures and Conjectures, *Archives internationales d'histoire des sciences* **43** (1993), 280–292. Newton developed two interrelated but distinct methods of solving the Kepler problem. It was the second solution of 1684 which is the prototype for an undated Newton manuscript in the Cambridge University Library copied for Locke in 1689–1690. (JGF) #23.1.27

BRENT, JOSEPH. *See* #23.1.45.

BRENTJES, SONJA. Varianten einer Ḥaǧǧāǧ—Version von Buch II der *Elemente,* pp. 47–67 in #23.1.59. Critical edition of quotations from an Arabic translation by al-Ḥajjāj (9th century) of Book II of Euclid's *Elements* in two Arabic manuscripts of the *Elements*: Escorial ar. 907, and Rabat, Hasaniya 53. The quotations are compared with a fragment of a medieval Arabic translation of Book II of the *Elements* in the manuscript Paris BN Persan 169H. (JPH) #23.1.28

BRIAN, ERIC. *La mesure de l'etat,* Paris: Albin Michel, 1994, 464 pp. See the book review (in French) by Pierre Crépel in *Historia Mathematica* **22** (1995), 327–330. (DEZ) #23.1.29

BRIGAGLIA, ALDO, AND MAMMONE, PASQUALE. Francesco Cecioni and the Construction of Division Algebras, pp. 27–46 in #23.1.31. Highlights the achievements of Francesco Cecioni (1884–1968), particularly in abstract algebra. Placing their analysis within the context of Italian mathematics of the first quarter of the 20th century, an environment in which algebra can scarcely be said to have thrived, the authors give a detailed discussion of Cecioni's work on constructing division algebras and, in so doing, show that Cecioni succeeded in producing results at the level of the masters in the field, Wedderburn and Dickson. (KVHP) #23.1.30

BRIGAGLIA, ALDO; CILBERTO, CIRO; AND SERNESI, E. (eds.) Algebra e geometria (1860–1940): Il contributo italiano, *Supplemento di Rendiconti del Circolo matematico di Palermo,* 2d ser., vol. **36** (1994), 277 pp., paperbound. This special issue of the *Rendiconti del Circolo matematico di Palermo* contains texts of 13 of the 17 talks presented at a conference on Italian contributions to algebra and geometry (1860–1940) organized by Aldo Brigaglia, Alberto Conte, and E. Sernesi in Cortona, Italy in 1992. The contributors, whose papers are abstracted separately, were Fabio Bardelli, Aldo Brigaglia and Pasquale Mammone, Guiseppina Casadio and Guido Zappa, Ciro Ciliberto and Claudio Pedrini, Alberto Conte, Paola Gario, Jeremy Gray, Thomas Hawkins, Dan Laksov, J. P. Murre, Lubŏs Nový, Laura Toti Rigatelli, and S. Xambò-Descamps. (KVHP) #23.1.31

BRYDEN, D. J. Made in Oxford: John Prujean's 1701 Catalogue of Mathematical Instruments, *Oxoniensia* **58** (1993), 263–285. Prujean worked in Oxford from 1664 until his death in 1706. His 1701 advertisement, listing over 20 instruments that he made and sold, is the earliest recorded such example outside London. Many instruments were designed by Oxford men. (JGF) #23.1.32

BRUNETT, CHARLES. Ocreatus, pp. 69–77 in #23.1.59. A Joan Ocreatus is credited in some 12th-century manuscripts with having translated the *Elements* from Arabic into Latin, and another ''Ocreatus'' explained the Saracen way of calculation to his teacher, Adelard of Bath. Burnett argues that Ocreatus is ''the Latin translation of the surname of a family … in the region of Bath.'' (JPH) #23.1.33

CAMPOS, ALBERTO. Reflexiones críticas acerca de la filosofía de la matemática de Kant [Critical Reflections on Kant's Philosophy of Mathematics], *Ideas y Valores* **92–93** (December, 1993), 5–40. Starting from a geometric point of view, the author presents a sequence of critical observations on Kant's philosophy of mathematics. (VA) #23.1.34

Casadio, Guiseppina, and Zappa, Guido. I contributi matematici di Francesco Faà di Bruno nel periodo 1873–1881, con particolare riguardo alla teoria degli invarianti [The Mathematical Contributions of Francesco Faà di Bruno during the Period 1873–1881, with Special Emphasis on the Theory of Invariants], pp. 47–70 in #23.1.31. Looks at the researches of the Italian mathematician, Francesco Faà di Bruno, during the nine years from 1873 to 1881. This time period found Faà di Bruno at work principally on the theory of invariants. His book, *Théorie des formes binaires* (1876), as well as its 1881 translation into German, receive special attention. (KVHP) #23.1.35

Cattani, Carlo, and Laserra, Ettore. The Italian Controversy on the Composition of Rigid Motions [in Italian], *Rivista di storia della scienza, Ser. II* **2,** no. 1 (1994), 183–225. A discussion of the ambiguous interpretation of Poincaré's theorem of 1899 concerning the composition of rigid motions. A sharp polemic took place in 1938 among the Italian mathematicians T. Levi-Cività, G. Lampariello, and A. Palatini. (LN) #23.1.36

Chabás, José, and Goldstein, Bernard R. Andalusian Astronomy: *al-Zîj al-Muqtabis* of Ibn al-Kammâd, *Archive for History of Exact Sciences* **48** (1994), 1–41. The 12th-century Andalusian astronomer Ibn al-Kammâd composed three tables based on sources that ultimately go back to Ptolemy and to Hindu astronomers. This paper describes his work as preserved in Latin in MS Madrid 10023. (JGF) #23.1.37

Chalbert, J.-L.; Barbin, E.; Guillemot, M.; Michel-Pajus, A.; Djebbar, A.; Borowczyk, J.; and Martzloff, J.-C. *Histoire d'algorithmes ''du caillou à la puce'',* Paris: Belin, 1994, 592 pp., 210 F. A book whose aim is to place algorithms in a historical and cultural context. Each chapter uses authentic passages that reflect different aspects of a particular theme and are chosen for their ''readibility'' by secondary and university students. Each passage is accompanied by mathematical explanations. (VJK) #23.1.38

Chandrasekar, S. *See* #23.1.82.

Charris, Jairo, *et al.* Obituario matemático 1992–1994. Parte I [Mathematical Obituary 1992–1994. Part I], *Lecturas matemáticas* **15** (1994), 203–217. Notes on the life and work of the mathematicians Jean Dieudonné, Antoni Zygmund, Stephen Kleene, Herbert Busemann, Daniel Gorenstein, Max Zorn, Ralph Boas, James Givens, Alston Householder, Boris Moishezon, John Kemeny, and Steven Bank, who died between 1992 and 1994. (VA) #23.1.39

Ciliberto, Ciro, and Pedrini, Claudio. Annibale Comessatti and Real Algebraic Geometry, pp. 71–102 in #23.1.31. Examines principally three papers by Annibale Comessatti published in 1913, 1924, and 1925 in which he classified rational real surfaces and developed the theory of real abelian varieties. While maintaining the spirit of Comessatti's proofs, the authors present his results in modern terms and look at extensions of his ideas by present-day mathematicians. (KVHP) #23.1.40

Ciliberto, Ciro. *See also* #23.1.31.

Clawson, Calvin C. *The Mathematical Traveler,* New York: Plenum, 1994, x + 307 pp., hardbound, $24.95. The first and last chapters of this book deal with anthropological, sociological, and neurophysiological issues related to our perception of numbers. The rest of the book concerns the development of numbers from the earliest times to the discovery of transfinite numbers, including descriptions of Chinese, Babylonian, and Mayan number systems and Gelfond's criterion for numbers of the form a^b to be transcendental. See *MR* 95h:01001. (DEZ) #23.1.41

Conte, Alberto. La scoperta e i primi tentativi di classificazione delle superficie di Enriques nella corrispondenza inedita di Federigo Enriques a Guido Castelnuovo [The Discovery of and the First Attempts at Classifying Enriques Surfaces in the Unpublished Correspondence of Federigo Enriques and Guido Castelnuovo], pp. 103–116 in #23.1.31. Draws from the newly available, unedited correspondence between Federigo Enriques and Guido Castelnuovo in order to detail the process of discovery involved in

the classification of so-called Enriques surfaces. The paper presents extensive quotations with interspersed explanatory commentary. (KVHP) #23.1.42

Crépel, Pierre. *See* #23.1.29.

Cromwell, Peter R. Kepler's Work on Polyhedra, *The Mathematical Intelligencer* **17**(3) (1995), 23–33. Describes the classification of polyhedra by Kepler in his *Harmonices mundi*. (TLB) #23.1.43

Crowe, Michael J. *A History of Vector Analysis: The Evolution of the Idea of a Vectorial System,* New York: Dover, 1994, xvii + 270 pp, paperbound, $7.00. A corrected reprint of the 1985 edition, which was a republication of the original 1967 edition. *See* #14.2.24. (DEZ) #23.1.44

Dauben, Joseph W. Searching for the Glassy Essence: Recent Studies on Charles Sanders Peirce, *Isis* **86** (1995), 290–299. An essay review of six books on the philosopher and mathematician Charles Sanders Peirce that describes earlier works on Peirce's writing: Joseph Brent, *Charles Sanders Peirce: A Life,* Bloomington: Indiana Univ. Press, 1993; John Patrick Diggins, *The Promise of Pragmatism: Modernism and the Crisis of Knowledge and Authority,* Chicago/London: Univ. of Chicago Press, 1994; Carl R. Hausman, *Charles S. Peirce's Evolutionary Philosophy,* Cambridge/New York: Cambridge Univ. Press, 1993; Edward C. Moore (ed.), *Charles Sanders Peirce and the Philosophy of Science: Papers from the Harvard Sesquicentennial Congress,* Tuscaloosa/London: Univ. of Alabama Press, 1993; Kenneth Laine Ketner (ed.), *Charles Sanders Peirce. Reasoning and the Logic of Things: The Cambridge Conference Lectures of 1898,* Cambridge, MA/London: Harvard Univ. Press, 1992; and Christian J. W. Kloesel, *Writings of Charles S. Peirce: A Chronological Edition,* Bloomington: Indiana Univ. Press, 1993. (DEZ) #23.1.45

David, H. A. First Occurrence of Common Terms in Mathematical Statistics, *The American Statistician* **49** (1995), 121–133. Valuable bibliographical list of apparent origins of dozens of technical terms and phrases in mathematical statistics. (IGG) #23.1.46

Deakin, Michael A. B. Women in Mathematics: Fact Versus Fabulation, *Australian Mathematical Society Gazette* **19** (1992), 105–114. Many historical accounts of women in mathematics overlook Theon's instruction to Hypatia: "To teach superstitions as truths is a most terrible thing." To pursue the truth about mathematical women in the past leads to recognition of the diversity of role models they provide by their disparate talents and interests. (JGF) #23.1.47

Dekker, Elly. An Unrecorded Medieval Astrolabe Quadrant from c. 1300, *Annals of Science* **52** (1995), 147. A newly recorded instrument from between 1291 and 1310 presents an early stage of development in the history of the astrolabe quadrant. (JGF) #23.1.48

De Lorenzo, Javier. Aportes epistemológicos del hacer matemático [Epistemological Contributions to Doing Mathematics], *Ideas y Valores* **92–93** (December, 1993), 79–95. The author's aim is to prove that mathematics has made major epistemological contributions not only as a cultural object but also due to its reasoning, its constituent character in science, and its conditioning character in apprehending reality. (VA) #23.1.49

De Lorenzo, Javier. El discurso matemático: Ideograma y lenguaje natural [Mathematical Discourse: Ideogram and Natural Language], *Mathesis* (*México*) **10** (1994), 255–272. An interpretation of the origins of the logicist movement and its evolution up to the era of the paradoxes, beginning with an analysis of Dedekind's work on the foundations of mathematics. (VA) #23.1.50

Diggins, John Patrick. *See* #23.1.45.

Djebbar, Ahmed. Deux mathématiciens peu connus de l'Espagne du XIe siècle: al-Mu'taman et Ibn Sayyid, pp. 79–91 in #23.1.59. Biographical and bibliographical details from Arabic sources on two 11th-century Islamic Spanish mathematicians: Yūsuf al-Mu'taman ibn Hūd, king of Saragossa and author of

the Istikmāl, and Ibn Sayyid of Valencia, who worked out a theory of algebraic curves which is now only known through references by the Islamic philosopher Ibn Bājja. *See also* #22.3.40 and #23.1.77. (JPH) #23.1.51

DJEBBAR, AHMED. *See also* #23.1.38.

DOLD-SAMPLONIUS, YVONNE. The Volume of Domes in Arabic Mathematicians, pp. 93–106 in #23.1.59. Analysis of a practical computation in the *Key of Arithmetic* of Al-Kāshī (15th century). The accuracy of the computation is also discussed. (JPH) #23.1.52

DORIER, JEAN-LUC. A General Outline of the Genesis of Vector Space Theory, *Historia Mathematica* **22** (1995), 227–261. Two main sources gave rise to the theory of linearity: the study of systems of linear equations and the search for an intrinsic geometrical analysis. The initial unification of linear questions took place around the concept of determinant, generalized to the countably infinite, and axiomatization from the late 19th century onwards has been influential. (JGF) #23.1.53

ERLICHSON, HERMAN. The Riddle of the Kepler-Motion Papers, *Archives internationales d'histoire des sciences* **43** (1993), 258–279. A Newton manuscript in the Cambridge University Library, or its source copy, is the first written record of Newton's solution to the Kepler problem, sent by Newton to Halley in 1684. (JGF) #23.1.54

ESPINOZA, MIGUEL. El desmigajador de la realidad: Wittgenstein y las matemáticas [The Crumble of Reality: Wittgenstein and Mathematics], *Mathesis* (*México*) **10** (1994), 171–186. The specificity of Wittgenstein's ideas on mathematics is compared with Platonism, intuitionism, and conventionalism. The author argues that Wittgenstein misses the most interesting parts of mathematics, its essence and pertinence. (VA) #23.1.55

FAUVEL, JOHN. The Mathematicians, in *Lit & Phil Bicentenary Lectures 1993,* Newcastle upon Tyne: Literary and Philosophical Society, 1994, 163–179. The Newcastle Lit & Phil was one of the first such societies. In its early years especially, it promoted mathematical lectures and discussions; the leading Tyneside mathematicians were members, and its honorary member Charles Hutton greatly encouraged the flow of young Northumbrian mathematicians who made careers down south. (JGF) #23.1.56

FIELD, J. V. The Relation Between Geometry and Algebra: Cardano and Kepler on the Regular Heptagon, in Eckhard Keßler (ed.), *Girolamo Cardano: Philosoph, Naturforscher, Arzt,* Harrasowitz Verlag, 1994, pp. 219–242. Whether the heptagon can be constructed makes a good test case for the relationship between geometry and algebra in the period before Descartes. Kepler considered (1619) that the side of the heptagon could not be known, while the algebraist Cardano (1570) believed it could; their disagreement springs from a difference in what each was prepared to regard as a solution to the problem. (JGF) #23.1.57

FOLKERTS, MENSO. Die Rithmachia des Werinher von Tegernsee, pp. 107–142 in #23.1.59. First edition of a recently discovered Latin text by Werinher von Tegernsee (around 1180) on the number-theoretical game "Rithmachia." (JPH) #23.1.58

FOLKERTS, MENSO, AND HOGENDIJK, JAN P. (eds.) *Vestigia Mathematica: Studies in Medieval and Early Modern Mathematics in Honour of H. L. L. Busard,* Amsterdam/Atlanta: Editions Rodopi, 1993, hardbound, 473 pp., Dfl. 200. Articles presented on the occasion of the 70th birthday of the Dutch historian of medieval mathematics H. L. L. Busard. In the introduction (pp. 7–14) the editors present a biography of Busard and a list of all his published works. The articles by Paul Bockstaele, Henk J. M. Bos, Sonja Brentjes, Charles Burnett, Ahmed Djebbar, Yvonne Dold-Samplonius, Menso Folkerts, Jan P. Hogendijk, Barnabas Hughes, Wolfgang Kaunzner, Paul Kunitzsch, Richard Lorch, Jan van Maanen, George Molland, Boris A. Rosenfeld, Christoph J. Scriba, Jacques Sesiano, A. Simi, and L. Toti Rigatelli are abstracted separately. (JPH) #23.1.59

FOWLER, DAVID. Could the Greeks Have Used Mathematical Induction?, Did They Use It? *Physis* **31** (1994), 252–265. Two extended comments in response to S. Unguru answering the two questions of the title with "yes" and "maybe." See #23.1.147. (JGF) #23.1.60

FRANCHELLA, MIRIAM. L. E. J. Brouwer: Towards Intuitionistic Logic, *Historia Mathematica* **22** (1995), 304–322. The development of Brouwer's ideas on logic in general as well as some laws (excluded middle, testability, and reciprocity of complementarity). Some statements of intuitionist logic were only formulated correctly after much rethinking. (JGF) #23.1.61

GÅRDING, LARS, AND SKAU, CHRISTIAN. Niels Henrik Abel and Solvable Equations, *Archive for History of Exact Sciences* **48** (1994), 81–103. An analysis of Abel's unpublished 1828 manuscript shows that Abel had a complete description of the roots of a solvable equation of prime degree, a result later ascribed to Kronecker and Weber. (JGF) #23.1.62

GARIO, PAOLA. Singolarità e fondamenti della geometria sopra una superficie nelle lettere a Castelnuovo [Singularities and Fundamentals of the Geometry on a Surface in Letters to Castelnuovo], pp. 117–150 in #23.1.31. Utilizes the newly available unedited correspondence of Castelnuovo, and especially letters to him by Corrado Segre and Federigo Enriques during the years 1894–1896, to trace the development of the theory of singularities of surfaces at the hands of these three mathematicians. An appendix contains the full transcriptions of the letters from Enriques used as sources in the paper. (KVHP) #23.1.63

GOLDSTEIN, BERNARD R. *See* #23.1.37.

GOMES DE SOUSA, JOAQUIM. *O modo de indagar novos astros* [*The Way to Find New Stars*], Curitiba: Universidade Federal do Paraná, 1992, 53 pp. A facsimile edition of the 1848 doctoral dissertation by Joaquim Gomes de Sousa presented to the Royal Military School at Rio de Janeiro. The foreword by Clóvis Pereira da Silva states that the author used Laplace's theories to expound on methods for determining the existence of new stars (planets) from the observed perturbations in the behavior of known stars without using optical instruments. (VA) #23.1.64

GÓMEZ, ADOLFO LEÓN. La silogística en Leibniz y Kant, y su parentesco [The Syllogistic in Leibniz and Kant, and Their Kinship], *Ideas y Valores* **92–93** (December, 1993), 41–46. The author's aim is to prove that the Kantian conception of syllogism arises from Leibnizian statements, something that may appear paradoxical at first due to their antithetical personal points of view on the subject. (VA) #23.1.65

GRANT, HARDY. What is Modern about "Modern" Mathematics?, *The Mathematical Intelligencer* **17**(3) (1995), 62–66. Grant describes two world views, the Platonist and the romantic, which began to develop around 1800. He asserts that mathematics is modern insofar as it participates in the romantic world view. (TLB) #23.1.66

GRATTAN-GUINNESS, IVOR. Why Did George Green Write His Essay of 1828 on Electricity and Magnetism? *The American Mathematical Monthly* **102** (1995), 387–396. A discussion of the content, sources, and recognition of George Green's 72-page *Essay on the Mathematical Analysis of Electricity and Magnetism.* The author also considers three strands in potential theory that preceded the essay and the role that Poisson played in it. (DEZ) #23.1.67

GRAY, JEREMY J. German and Italian Algebraic Geometry, pp. 151–184 in #23.1.31. Provides an analysis of the differences of emphasis and approach between the German and the Italian schools of algebraic geometry in the late 19th and early 20th centuries. Framing the argument in the context of differing aesthetic interpretations of algebraic geometry in the two countries, the author examines principally ideas of Max Noether, Enriques, and Castelnuovo relative to the Riemann–Roch Theorem. (KVHP) #23.1.68

GRAY, JEREMY J. Mathematics in Cambridge and Beyond, in Richard Mason (ed.), *Cambridge Minds,* Cambridge/New York: Cambridge Univ. Press, 1994, pp. 86–99. It took from Cayley's appointment as Sadleirian professor in 1864 to the 1920s for Cambridge mathematics to transform from a community of gentlemen and (some) scholars to the modern organized system for producing researchers. (JGF) #23.1.69

GUILLEMOT, M. *See* #23.1.38.

GUPTA, RADHA CHARAN. A Problem on Interest in the *Nārada-Purāna, Ganita-Bhāratī: Bulletin of the Indian Society for History of Mathematics* **15** (1993), 67–69. The mathematical portion of the *Nārada-Purāna,* Chapter 54, is composed of 60 verses, most of which are algorithms. This paper explains "a couplet or rule" involving a problem in simple interest which had eluded contemporary scholars. It turns out the problem can be resolved with a linear equation. (JA) #23.1.70

GUPTA, RADHA CHARAN. Rectification of Ellipse from Mahāvīra to Ramanujan, *Ganita-Bhāratī. Bulletin of the Indian Society for History of Mathematics* **15** (1993), 14–40. This is a collection of observations on the "accuracy, form, and history" of various techniques and methods of approximation of the perimeter of an ellipse, from the 9th to the 20th century. Featured are efforts of Mahāvīra, Johannes Kepler, Leonhard Euler, Sipos Paul and B. Ekwall, Aida Ammei, Chu Huang, Paul Mansion, Thomas Muir, Giuseppe Peano, and Srinivasa Ramanujan. (JA) #23.1.71

HANNABUSS, KEITH, AND WILSON, ROBIN. Stamp Corner: Mathematical Physics I, *The Mathematical Intelligencer* **17**(3) (1995), 76. Stamps commemorating Maxwell, Hertz, Lorentz, and Einstein are accompanied by a brief description of their contributions. (TLB) #23.1.72

HAUSMAN, CARL R. *See* #23.1.45.

HAWKINS, THOMAS. Lie Groups and Geometry: The Italian Connection, pp. 185–206 in #23.1.31. Focuses on the work of Corrado Segre and Gino Fano in the theory of Lie groups and of Lie algebras. After first exploring the reception in Italy of Klein's *Erlanger Programm,* the author examines Fano's generalization of Hesse's transfer principle and the use that Élie Cartan made of this in his determination of the irreducible representations of semisimple complex and real Lie algebras. Cartan's use of Segre's results in this classification of real irreducible representations of simple real Lie algebras is also discussed. (KVHP) #23.1.73

HESTENES, MAGNUS R., AND TODD, JOHN. *NBS-INA—The Institute for Numerical Analysis—UCLA 1947–1954: Mathematicians Learning To Use Computers,* Washington, DC: US Government Printing Office, 1991, ix + 471 pp., paperbound, $12.50. A description of the adoption of the Turing machine by mathematicians in the 1950s that emphasizes the research and educational aspects of the INA. (DEZ) #23.1.74

HOGENDIJK, JAN P. The Arabic Version of Euclid's *On Division,* pp. 143–162 of #23.1.59. Edition of all known medieval Arabic fragments (with English translation) of Euclid's treatise *On Division.* The Greek original is lost. (JPH) #23.1.75

HOGENDIJK, JAN P. The Geometrical Parts of the *Istikmal* of Yusuf al-Mu'taman ibn Hud (11th Century): An Analytic Table of Contents, *Archives internationales d'histoire des sciences* **41** (1991), 207–281. Al-Mu'taman, king of Saragossa from 1081–1085, was possibly the most brilliant geometer of the Andalusian tradition. Some three-quarters of his *Book of Perfection* is extant in various manuscripts. The geometry chapters cover most of the subject matter of Euclid's *Elements* and *Data,* Archimedes' *On the Sphere and Cylinder,* Apollonius' *Conics,* and other Greek and Arabic works. *See also* #22.3.40 and #23.1.52. (JGF) #23.1.76

HOGENDIJK, JAN P. *See also* #23.1.59.

HORMIGÓN, M., AND MILLÁN, A. Projective Geometry and Applications in the Second Half of the Nineteenth Century, *Archives internationales d'histoire des sciences* **42** (1992), 269–289. The great variety of projective geometry was linked to its social role: it provided a technical language and enabled the development of graphical methods in engineering. (JGF) #23.1.77

HUGHES, BARNABAS. Robert Recorde and the First Published Equations, pp. 163–171 of #23.1.59. On linear and quadratic equations in the *Whetstone of Witte* by Robert Recorde (1510–1558), published in facsimile in 1969. (JPH) #23.1.78

JACKSON, MYLES. Natural and Artificial Budgets: Accounting for Goethe's Economy of Nature, *Science in Context* **7** (1994), 409–431. The notion of a budget was crucial to Goethe's administration of Saxe-

Weimar-Eisenach and his investigation of nature. Nature's budgets were heuristic tools for elucidating natural processes, and could be applied to the realm of social order. Law, order, balance and budget formed the basis of his financial reform of the duchy. (JGF) #23.1.79

Jaramillo Uribe, Juan Manuel. La reconstrucción teórico-conjuntista de las teorías empíricas: Una possible alternativa a la axiomatización formal [The Set-Theoretical Reconstruction of Empirical Theories: A Possible Alternative to Formal Axiomatization], *Ideas y Valores* **92–93** (December, 1993), 47–58. A description of the proposal of J. D. Sneed, W. Balzar, W. Stegmüller, and C. U. Moulines for the systematization of scientific theories known as ''structural conception.'' The author indicates why ''structural conception'' would be more adequate to express the axiomatics of empirical theories. (VA) #23.1.80

Johnson, W. Some Women in the History of Mathematics, Physics, Astronomy and Engineering, *Journal of Material Processing Technology* **49** (1994), 31–71. Short studies of 15 women, from Hypatia to Dame Kathleen Ollerenshaw. (JGF) #23.1.81

Johnson, W., and Chandrasekar, S. Voltaire's Contribution to the Spread of Newtonianism. II. Élémens de la philosophie de Neuton, *International Journal of Mechanical Science* **32** (1990), 521–546. A detailed illustrated survey of Voltaire's *Élémens* (1738), of his work with Mme du Chatelet, of her translation of *Principia,* and related work by Locke (1720), Pemberton (1728), and Algarotti (1737). (JGF) #23.1.82

Kaunzner, Wolfgang. Über die beiden nachgelassenen mathematischen Handschriften von Adam Ries, pp. 173–204 of #23.1.59. Study of the algebraic parts of two manuscripts by Adam Ries (1492–1559), the *Coss* and Codex Dresden C 349. (JPH) #23.1.83

Ketner, Kenneth Laine. *See* #23.1.45.

Kloesel, Christian J. W. *See* #23.1.45.

Krejca, Sharon Ann. The Origins of Calculus in the Medieval Period, D. A. dissertation, University of Illinois at Chicago, 1992, 107 pp. An exploration of the spread of ideas from ancient to medieval times and the dissemination of medieval works throughout Europe. The study of these medieval works in mechanics and motion theory elicits contributions to the development of calculus that are not widely known. Dissertation Abstracts International—B 53/12, p. 6337, June 1993. (ACL) #23.1.84

Kunitzsch, Paul. ''The Peacock's Tail'': On the Names of Some Theorems of Euclid's *Elements,* pp. 205–214 in #23.1.59. Discusses the Arabic origins of some medieval Latin names for theorems in Books I–IV of the *Elements*. (JPH) #23.1.85

Laksov, Dan. Remarks on Giovanni Zeno Giambelli's Work and Life, pp. 207–218 in #23.1.31. Presents a biographical sketch and bibliography of the Italian mathematician Giovanni Giambelli (1879–1953). A student of Corrado Segre, Giambelli is most noted for his complete determination of the multiplicative structure of the intersection ring of Grassmann manifolds and for the so-called Giambelli–Thom–Porteus determinantal formula. (KVHP) #23.1.86

Lal, Ramashankar, and Prasad, Ramashis. Integral Solutions of the Equation $Nx^2 + 1 = y^2$ in Ancient Indian Mathematics (Cakravāla or the Cyclic Method), *Ganita-Bhāratī: Bulletin of the Indian Society for History of Mathematics* **15** (1993), 41–54. Rather than call this the Pell equation, as is common in the West, this paper suggests that it should be called the Jayedeva–Bhāskara equation. The rules for solving these equations (Cakravāla is a class of iterative procedures) of Ācārya Jayadeva (ca. 100 A.D.) and Bhāskara II (1150 A.D.) are stated in verse form and in modern mathematical notation and analyzed and illustrated. An improvement upon Bhāskara's method due to Nārāyana (1350 A.D.) is also discussed. (JA) #23.1.87

Lam, Lay Yong. *Jiu zhang suanshu* (*Nine Chapters on the Mathematical Art*): An Overview, *Archive for History of Exact Sciences* **47** (1994), 1–51. *Jiu zhang suanshu* is one of the earliest and most important Chinese texts, and is built on a rod-numeral system with conceptually the same decimal place-value

structure (albeit with alternating orientation) as our own. It encompassed probably most of Chinese mathematical knowledge at the beginning of the second century A.D., and had a great influence. (JGF) #23.1.88

LANCASTER, H. O. *Quantitative Methods in Biological and Medical Sciences: A Historical Essay,* New York/Berlin/Heidelberg: Springer-Verlag, 1994, xvii + 297 pp., $69. A survey of how quantitative methods such as counting, measurement, and statistical analysis influenced the development of modern biological and medical science. (DEZ) #23.1.89

LANGE, LES. Did Plutarch Get Archimedes' Wishes Right?, *The College Mathematics Journal* **26** (1995), 199–204. The author finds that Plutarch faithfully recorded that Archimedes' tomb depicts a sphere in a cylinder rather than the other way around. His moral: be careful about secondary sources. (DEZ) #23.1.90

LARVOR, BRENDAN. History, Methodology and Early Algebra, *International Studies in the Philosophy of Science* **8** (1994), 113–124. Two case studies in early algebra help explore the limits of "critical rationality" (that is, rationality as rule-following): Jerome Cardan's *Ars magna* and Albert Girard's *L'invention nouvelle en l'algèbre.* Questions raised in the philosophy of science by Kuhn and others can also be asked of the history of mathematics; a modest methodological anarchism seems the appropriate stance. (JGF) #23.1.91

LASERNA, MARIO. Geometría griega, la demostración y el método matemático experimental [Greek Geometry, Proof, and Mathematical–Experimental Method], *Ideas y Valores* **92–93** (December, 1993), 59–77. A discussion of the unity of the scientific method using the "scientificity" of Greek geometry as a paradigm. (VA) #23.1.92

LASERRA, ETTORE. *See* #23.1.36.

LAUGWITZ, ANNETTE, AND LAUGWITZ, DETLEF. Impressions from Riemann's Native Country, *The Mathematical Intelligencer* **17**(3) (1995), 37–40. Descriptions and photographs of the villages of Breselenz, Quickborn, and Luneburg in Lower Saxony where Georg Bernhard Riemann grew up. (TLB) #23.1.93

LAUGWITZ, DETLEF. Early Delta Functions and the Use of Infinitesimals in Research, *Revue d'histoire des sciences* **45** (1992), 115–128. In their work on mathematical physics around 1820, Cauchy, Fourier, and Poisson used methods which were to be rediscovered more than a century later. Delta functions and summation methods for divergent series and integrals were based on the use of infinitely small and large quantities which were developed systematically in Cauchy's textbooks. (JGF) #23.1.94

LAUGWITZ, DETLEF. *See also* #23.1.93.

LÉRTORA MENDOZA, CELINA ANA. Bibliografía argentina de historia de la ciencia: 1969–1994 [Argentinean Bibliography in the History of Science: 1969–1994], *Boletin de historia de la ciencia* **13** (25) (1994), 3–48. (VA) #23.1.95

LÉRTORA MENDOZA, CELINA ANA. *Fuentes para el estudio de las ciencias exactas en Colombia* [*Sources for the Study of Exact Sciences in Colombia*], Santafé de Bogotá: Academia Colombiana de Ciencias Exactas, Físicas y Naturales, Colección Enrique Pérez Arbeláez, No. 9, 1995, 312 pp., $10. A contribution to the history of Latin American science in colonial times based on manuscripts from archives in Santafé de Bogotá, Medellín, and Popayán. The book consists of chapters on physics, logic, and mathematics, each containing a critical and historical introduction. Each manuscript is described by author, place, date and subject, then analyzed from its content, sources, and codex and paleographic points of view. In particular, for each manuscript there is a transcription of the index in its original language (mostly Latin). (VA) #23.1.96

LÉRTORA MENDOZA, CELINA ANA. Fuentes para la historia de la astronomía en los siglos XIV y XV: Eclipses y tablas [Sources for the History of Astronomy in the 14th and 15th Centuries: Eclipses

and Tables], *Mathesis* (*México*) **10** (1994), 291–312. Sources for a research project on pre-Copernican astronomy, with an announcement of some papers with mathematical implications. (VA) #23.1.97

LONGDON, L. W., AND STOCKS, D. C. Clement John Tranter (1909–1991), *Bulletin of the London Mathematical Society* **26** (1994), 497–502. C. J. Tranter spent most of his career at the Royal Artillery College, Woolwich. His research in ballistics involved certain classes of boundary value problems and certain dual integrals and series, which led to work in heat transfer, vibrations, transform methods, Bessel functions, and potential theory. There is a list of publications and a photograph. (JA) #23.1.98

LORCH, RICHARD. Abū Kāmil on the Pentagon and Decagon, pp. 215–252 in #23.1.59. Edition of the 14th-century Latin translation of the work by Abū Kāmil (9th century) on the pentagon and the decagon, in the Latin manuscript Paris, B. N. 7377 A. *See also* #23.1.137. (JPH) #23.1.99

MAJUMDAR, PRADIP KUMAR. Studies of Mathematics in Three Hundred Years Old [sic] Calcutta, *Ganita-Bhāratī: Bulletin of the Indian Society for History of Mathematics* **15** (1993), 55–66. Indigenous educational institutions (Serampore Mission, Hindu College, and the Calcutta Book Society) first gained strength in Calcutta in the early part of the 19th century. The first mathematics book in Bengali was written in 1817; numerous other 19th-century mathematics authors and their works are mentioned. W. H. Young was the first professor of Higher Mathematics at Calcutta University (1913), and over 75 Calcutta mathematicians and their research interests (1908–1991) are listed. In 1908, the Calcutta Mathematical Society was founded, its library was established, and its *Bulletin* began publication. (JA) #23.1.100

MALET, ANTONI. Gregorie, Descartes, Kepler, and the Law of Refraction, *Archives internationales d'histoire des sciences* **40** (1990), 278–304. James Gregorie's proof of the sine law of refraction, published in 1663, provides indirect evidence supporting Kramer's conjecture that Descartes made his discovery of the sine law of refraction through geometrical considerations (and not through a dynamical model, or empirical observation, or perspective conceptualization, or stealing from Snell). (JGF) #23.1.101

MAMMONE, PASQUALE. *See* #23.1.30.

MANDREKAR, V. Mathematical Work of Wiener, *Notices of the American Mathematical Society* **42** (1995), 664–669. A description of the fundamental contributions of Norbert Wiener in analysis and random processes, from a Centenary Congress held in Michigan in 1994. Some connections of Wiener's work to contemporary research are discussed. (DEZ) #23.1.102

MARTZLOFF, J.-C. *See* #23.1.38.

MERCIER, RAYMOND. The Date of the *Mahāsiddhānta, Ganita-Bhāratī: Bulletin of the Indian Society for History of Mathematics* **15** (1993), 1–13. From internal evidence, the astronomical work *Mahāsiddhānta* is dated by some scholars to the 10th century A.D. and by others to early in the 16th century. This paper argues for the later date. (JA) #23.1.103

MICHEL-PAJUS, A. *See* #23.1.38.

MIÉVILLE, D. (ed.) *Études logiques,* Neuchatel: Centre de recherches sémiologiques, 1993, 169 pp. Articles on Port-Royal logic, Tarski's theory of truth, and Boole's logic. (IGG) #23.1.104

MILLÁN, A. *See* #23.1.77.

MILNOR, JOHN. A Nobel Prize for John Nash. *The Mathematical Intelligencer* **17**(3) (1995), 11–17. A survey of Nash's mathematical work. (TLB) #23.1.105

MIROWSKI, PHILIP. A Visible Hand in the Marketplace of Ideas: Precision Measurement as Arbitrage, *Science in Context* **7** (1994), 563–589. Myths about the unreasonable effectiveness of mathematics in science flourish when little attention is paid to the practice of quantitative measurement. A history of practices of treating quantitative measurement error realizes that no individual can fix the magnitude of an error estimate: the social construction of error must be given a more precise meaning. (JGF) #23.1.106

MOLLAND, GEORGE. *Mathematics and the Medieval Ancestry of Physics,* Brookfield, VT: Variorum, 1995, 352 pp., hardbound, $89.95. An examination of ways in which ancient mathematics was assimilated in the Middle Ages and how mathematics was transformed in the 17th century, especially by Descartes. Works by Bradwardine, Campanus, Richard Swineshead, John Dumbleton, Cornelius Agrippa, Nicole Oresme, and Albertus Magnus are examined. (DEZ) #23.1.107

MOLLAND, GEORGE. Roger Bacon's *Geometria speculativa,* pp. 265–303 of #23.1.59. Edition of the Latin text, with English translation on facing pages, of a hitherto unpublished work on theoretical geometry by Roger Bacon (1214–1294). (JPH) #23.1.108

MOORE, EDWARD C. *See* #23.1.45.

MOORE, GREGORY H. The Axiomatization of Linear Algebra: 1875–1940, *Historia Mathematica* **22** (1995), 262–303. The abstract notion of vector space was first isolated by Peano (1888) in geometry (and in a more limited way by Darboux in 1875), but was not influential until rediscovered around 1920 by three analysts (Banach, Hahn, and Wiener) and an algebraist (Noether.) The notion developed quickly in two distinct areas: functional analysis and ring theory. (JGF) #23.1.109

MORAIN, FRANÇOIS. *See* #23.1.138.

MOSTERÍN, JESÚS. Los números naturales como base de datos uninversal [Natural Numbers as a Universal Data Base], *Ideas y Valores* **92–93** (December, 1993), 121–131. In order to measure the complexity of finite symbolic objects, the author illustrates the codification of these objects using natural numbers in various situations. (VA) #23.1.110

MUGLER, DALE H. *See* #23.1.3.

MÜHLHAUSEN, ELIZABETH. Discovering the Discovered Integral: William Henry Young und des Lebesque-Integral [in German], *NTM* **2** (1994), 149–158. In 1902 Lebesgue published his theory of integration. Independently, W. H. and G. C. Young developed a similar theory. On learning of Lebesgue's work they published a revised version in which his ideas were discussed. (JGF) #23.1.111

MULLEN, GARY L. A Candidate for the ''Next Fermat Problem,'' *The Mathematical Intelligencer* **17**(3) (1995), 18–22. Proposes the problem of proving that there are $n - 1$ mutually orthogonal Latin squares if and only if n is a prime power, and reviews the history of this problem. (TLB) #23.1.112

MUÑOZ QUEVEDO, JOSÉ M. El tiempo y la teoría de conjuntos [Time and Set Theory], *Ideas y Valores* **92–93** (December, 1993), 97–119. From the author's abstract: The author proposes a temporal set theory, in which not all sets exit simultaneously, but the universe of sets expands with time. The construction of this universe uses a predicative temporal calculus of modal type, thus avoiding time quantification. He shows how time influences the set theoretical universe, and conversely how the validity of certain desirable properties of sets conditions the temporal structure. (VA) #23.1.113

MURRE, J. P. On the Work of Gino Fano on Three-Dimensional Algebraic Varieties, pp. 219–230 in #23.1.31. Provides an outline of Fano's results on three-dimensional algebraic varieties and juxtaposes this with a presentation of some of the modern extensions of that work. (KVHP) #23.1.114

NEUMANN, PETER M., AND RAYNER, M. E. William Leonard Farrar (1893–1990), *Bulletin of the London Mathematical Society* **26** (1994), 395–401. Having been influenced by work of G. N. Watson and E. T. Whittaker, Farrar's mathematical research interests centered on analysis, specifically the convergence of infinite series. He spent almost all of his career (1925–1963) at Hertford College, Oxford, where he also had administrative roles. He served as an editor of several journals and wrote 10 textbooks. There is a list of publications and a photograph. (JA) #23.1.115

NOBRE, SERGIO. La contribución de Christian Wolff (1679–1754) a la popularización de las matemáticas en la primera mitad del siglo XVIII [The Contribution of Christian Wolff (1679–1754) to the Popularization of Mathematics in the First Half of the 18th Century], *Mathesis* (*México*) **10** (1994), 153–169. The author shows the importance and influence of Christian Wolff's books on the diffusion of the mathematics of his time in Germany. (VA) #23.1.116

Nový, Luboš. Le changement du système des notions algébriques, pp. 231–242 in #23.1.31. Opens with a brief account of internalist vs. externalist approaches to the history of mathematics before stressing the importance of historical studies on the evolution of particular concepts. The article then briefly outlines the evolution of algebraic concepts like field and group from the close of the 19th century through the Second World War. (KVHP) #23.1.117

Orłowska, Ewa. *See* #23.1.18.

Parshall, Karen Hunger, and Rowe, David E. *The Emergence of the American Mathematical Research Community, 1876–1900: J. J. Sylvester, Felix Klein, and E. H. Moore,* Providence: American Mathematical Society, 1994, xxiv + 500 pp., hardbound, $100. A detailed account of the transformation of the United States from a mathematical backwater to a major presence during the period from 1876 to 1900. The three major figures in this transformation are Sylvester, Klein, and E. H. Moore. The principal institutions are Johns Hopkins, Göttingen, and the University of Chicago. (DEZ) #23.1.118

Pedrini, Claudio. *See* #23.1.40.

Peña, Jairo Iván. Wittgenstein y el debate sobre la fundamentación de las matemáticas [Wittgenstein and the Controversy over the Foundations of Mathematics], *Ideas y Valores* **92–93** (December, 1993), 133–156. A discussion of Wittgenstein's participation and influence in the debate on the foundations of mathematics. (VA) #23.1.119

Pereira da Silva, Clóvis. *A Matemática no Brasil: Uma história de seu desenvolvimento* [*Mathematics in Brazil: A History of its Development*], Curitiba: Universidade Federal do Paraná, 1992, 241 pp. A historical study of mathematics and its development in Brazil from 1810 to 1920. The sociological and cultural milieu, and a close analysis of doctoral theses at the Escola Militar da Corte de Rio de Janeiro and its successors, form the basis of the book. (VA) #23.1.120

Pereira da Silva, Clóvis. Las matemáticas en Brasil: Su desarrollo a partir de 1810 [The Mathematics in Brazil. Its Development since 1810], *Mathesis* (*México*) **10** (1994), 209–234. A historical review of the teaching of mathematics and the development of its contents in Brazil from 1810 through the 1970s. Special mention is made of Otto de Alencar Silva's role in severing the ties to Comte's positivism in the late 19th century. The author also considers the influence and work in Brazil of some French, Italian, and Portuguese mathematicians. (VA) #23.1.121

Pereira da Silva, Clóvis. Otto de Alencar Silva: Um pionero da pesquisa matemática no Brasil [Otto de Alencar Silva: A Pioneer in Mathematical Research in Brazil], *Revista da Sociedade brasilera da história das ciências* **7** (1992), 31–40. From the author's abstract: Otto de Alencar Silva was undoubtedly the most important Brazilian mathematician from the late 19th century. In 1898 he initiated the rupture cycle of the teaching of archaic mathematics in Brazil at the Polytechnic School of Rio de Janeiro. We discuss his reaction to Comte's positivist ideology on Brazilian mathematics. (VA) #23.1.122

Pereira da Silva, Clóvis. *See also* #23.1.64.

Pier, Jean-Paul (ed.) *Development of Mathematics 1900–1950,* Basel/Boston/Berlin: Birkhäuser, 1994, xviii + 729 pp., hardbound, $75. A collection of 12 essays in French and English by prominent mathematicians on the development of their fields of expertise. (DEZ) #23.1.123

Porter, Theodore M. Making Things Quantitative, *Science in Context* **7** (1994), 389–407. Quantification is not merely a strategy for describing the social and natural worlds, but a means of recognizing them, often allied to systems of control; considerable feats of human organization are required to create stable, standardized measures. (JGF) #23.1.124

Porter, Theodore M. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life,* Princeton: Princeton Univ. Press, 1995, xiv + 310 pp., $24.95, £19.95. (DEZ) #23.1.125

Power, Michael. From the Science of Accounts to the Financial Accountability of Science, *Science*

in Context **7** (1994), 355–387. As mathematicians and others celebrate the quincentenary of Pacioli's *Summa,* university departments are increasingly subject to the agencies of accounting. Accountants no longer trace their conceptual origins to ''science''; financialism looks set to displace scientism as cultural authority. (JGF) #23.1.126

PRASAD, RAMASHIS. *See* #23.1.87.

RAMOS ARENAS, JAIME. Sobre la naturaleza de la tesis de Church [On the Nature of Church's Thesis], *Ideas y Valores* **92–93** (December, 1993), 157–167. The author contends that Church's assertion that a function is effectively computable if and only it is recursive may be more suggestive and interesting if we view it as a conjecture according to which a function is only computable, in an absolute sense, if it is recursive. (VA) #23.1.127

RAYNER, M. E. *See* #23.1.115.

ROBLES, JOSÉ A. *See* #23.1.21.

ROSEN, MICHAEL I. Niels Hendrik [sic] Abel and Equations of the Fifth Degree, *The American Mathematical Monthly* **102** (1995), 495–505. A sketch of Abel's proof of the unsolvability of the quintic is preceded by the author's proof that ''is not identical with that of Abel but is in the spirit of his proof and uses nothing that was unavailable to him.'' Abel's role is placed in a historical context. (DEZ) #23.1.128

ROSENFELD, BORIS ABRAMOVICH. ''Geometric Trigonometry'' in Treatises of al-Khwārizmī, al-Māhānī and Ibn al-Haytham, pp. 305–308 in #23.1.59. On the history of some rules for the solution of spherical triangles which occur in an astronomical context in Arabic texts from the 9th through the 11th centuries. (JPH) #23.1.129

ROSS, SYDNEY. De Morgan Tussles with Smith's *Harmonics* in a Comic Poem, *British Journal for the History of Science* **27** (1994), 467–471. De Morgan's 1857 poem recounts his grappling with Robert Smith's theory of beats of imperfect consonances in his Euclidean-style *Harmonics* of 1749. (JGF) #23.1.130

ROTH, K. F., AND VAUGHAN, R. C. Theodor Estermann (1902–1991), *Bulletin of the London Mathematical Society* **26** (1994), 593–606. Theodor Estermann was born in Germany and named after the modern Zionist, Theodor Herzel. A student of Hans Rademacher, he married Alfred Pringsheim's granddaughter and in 1925 came to England to study. His research interests included measure theory, convex bodies, analytic number theory, and applications of Kloosterman sums to the Hardy–Littlewood method. In the late 1930s much of his work was related to that of I. M. Vinogradov. There is a list of publications and a photograph. (JA) #23.1.131

ROWE, DAVID E. *See* #23.1.118.

SAGAN, HANS. *Space-Filling Curves,* New York/Berlin/Heidelberg: Springer-Verlag, 1994, xv + 193 pp., hardbound, $29.95. A textbook containing many historical notes on the development of space-filling curves. (DEZ) #23.1.132

SÁNCHEZ BOTERO, CLARA HELENA. Algunos aspectos del patrimonio matemático colombiano. La *Revista de matemáticas elementales,* 1952–1967 [Some Aspects of the Colombian Mathematical Heritage. The *Revista de matemáticas elementales,* 1952–1967], *Mathesis* (*México*) **10** (1994), 313–330. The author assesses the significant role played by the first professional Colombian mathematical Journal, the *Revista de matemáticas elementales.* (VA) #23.1.133

SCHENK, GÜNTER. Zur Logikentwicklung in der DDR, *Modern Logic* **5** (1995), 248–269. The author views the development of logic in the former German Democratic Republic (GDR) as a topic for historical study as a result of German reunification, and presents a sketch of the major characteristics, contributors, and contributions to the study of logic, in particular formal logic, in the GDR. (IA) #23.1.134

SCRIBA, CHRISTOPH J. Zur Aufgabe 86 des Byzantinischen Rechenbuchs Cod. Vindob. Phil. gr. 6, pp. 309–314 in #23.1.59. Analysis of a problem on congruences in a 15th-century Byzantine text on arithmetic. The author explains the method of solution, which had been misunderstood by Hunger and Vogel, who published this text in 1963. (JPH) #23.1.135

SEGRE, MICHAEL. Peano's Axioms in Their Historical Context, *Archive for History of Exact Sciences* **48** (1994), 202–342. Peano's axioms are seen against the development of mathematical rigor from ancient times to Cauchy and beyond, and in relation to analogous contemporary work such as that of Dedekind. Unlike predecessors such as Boole, Peano did not attempt to mathematize logic but was seeking a clear and rigorous presentation of arithmetic. (JGF) #23.1.136

SERNESI, E. *See* #23.1.31.

SESIANO, JACQUES. La version latine médiévale de *l'Algèbre* d'Abū Kāmil, pp. 315–452 in #23.1.59. Critical edition (96 pages) of the 14th-century Latin translation of the *Algebra* of Abū Kāmil, with an extensive Latin–Arabic glossary. In the introduction, the translator is conjectured to be Guglielmo de Lunis. Appended is an edition of the fragment by Abū Kāmil on Diophantine equations in the same Latin manuscript. See also #23.1.99. (JPH) #23.1.137

SHALLIT, JEFFREY, WILLIAMS, HUGH C., AND MORAIN, FRANÇOIS. Discovery of a Lost Factoring Machine, *The Mathematical Intelligencer* **17**(3) (1995), 41–47. Describes the successful search for a sieve machine designed by Eugene Olivier Carissan in 1913–1919. The authors explain the sieving technique for factoring, mention other sieving machines, and give a brief life of Carissan and his brother Pierre, who worked on an earlier machine. (TLB) #23.1.138

SHENITZER, ABE. *See* #23.1.151 and #23.1.152.

SHEYNIN, OSCAR. Bertrand's Work on Probability, *Archive for History of Exact Sciences* **48** (1994), 155–199. A full description of the work on probability and error of J. L. F. Bertrand. Although in 1855 he translated Gauss's writings on error theory and least squares, Bertrand's own work on probability was done between 1875 and 1892. (JGF) #23.1.139

SHOZO, MOTOYAMA. *Tecnologia e industrializaçaõ no Brasil: Uma perspectiva histórica* [*Technology and Industrialization in Brazil: A Historical Perspective*], Saõ Paulo: Centro Estadual de Educaça Tecnológica Paula Souza, 1994, 450 pp. A discussion of the nature of the relationship between technology and economic growth in general, and industrialization in particular. (VA) #23.1.140

SIMI, A., AND TOTI RIGATELLI, L. Some 14th- and 15th-Century Texts on Practical Geometry, pp. 453–470 in #23.1.59. Summaries of four unpublished Italian manuscripts. (JPH) #23.1.141

SKAU, CHRISTIAN. *See* #23.1.62.

SKOWRON, ANDRZEJ. *See* #23.1.18.

STEELE, BRETT D. Muskets and Pendulums: Benjamin Robins, Leonard Euler and the Ballistics Revolution, *Technology and Culture* **35** (1994), 348–382. In just 11 years (1742–1753) ballistics was revolutionized by Benjamin Robins and Leonhard Euler, in one of the first significant applications of Newtonian mechanics to engineering analysis, as well as the coupling of differential equations with complex experimental results. This revolution challenges the perceived wisdom that mathematical analysis and experimental science had little interaction in 18th-century science. (JGF) #23.1.142

STOCKS, D. C. *See* #23.1.98.

STRUIK, DIRK. Book Review, *Historia Mathematica* **22** (1995), 323–326. The author, an eminent differential geometer, reviews the book by Karin Reich, *Die Entwicklung des Tensorkalküls: Vom absoluten Differentialkalkül zur Relativitätstheorie.* (See #22.4.148.) Struik concludes that Reich's book "will be the definitive exposition of the history of the tensor calculus up to 1916." (DEZ) #23.1.143

SWERDLOW, NOEL. Otto E. Neugebauer (26 May 1899–19 February 1990), *Proceedings of the American Philosophical Society* **137** (1993), 137–165. Obituary of the Austrian-born historian who "entirely reformed and to some extent created" our understanding of mathematics and astronomy in the ancient world, and who, in *The Exact Sciences in Antiquity,* wrote "the finest book ever written on any aspect of ancient science." (JGF) #23.1.144

THRO, E. BROYDRICK. Leonardo da Vinci's Solution to the Problem of the Pinhole Camera, *Archive for History of Exact Sciences* **48** (1994), 343–371. The problem of why luminous bodies cast onto a screen different images at different distances from the screen was first solved not by Maurolico (whose later work is, in any case, only partly correct) but by Leonardo da Vinci in the *Codex atlanticus* of 1508–1514. (JGF) #23.1.145

TODD, JOHN. *See* #23.1.74.

TOTI RIGATELLI, LAURA. La teoria di Galois classica in Italia nella prima metà del XX secolo [Classical Galois Theory in Italy in the First Half of the Twentieth Century], pp. 243–254 in #23.1.31. Examines the contributions to Galois theory of the Italian mathematicians Fortunato Bucca, Pacifico Mazzioni, Michele Cipolla, Vincenzo Amato, and Angela Sorrentino from roughly 1900 to 1935. (KVHP) #23.1.146

TOTI RIGATELLI, LAURA. *See also* #23.1.141.

UNGURU, SABATAI. Fowling After Induction, *Physis* **31** (1994), 267–272. Response to #23.1.60. (JGF) #23.1.147

VAN BRUMMELEN, GLEN. Lunar and Planetary Interpolation Tables in Ptolemy's *Almagest, Journal for the History of Astronomy* **25** (1994), 297–311. Errors in the 150 numerical tables of Ptolemy's *Almagest* are usually quite small. Several auxiliary tables, however, contain entries in error by one or two units in the first of the two sexagesimal places. These errors are analyzed and explained. (JGF) #23.1.148

VAN MAANEN, JAN A. The "Double-Meaning" Method for Dating Mathematical Texts, pp. 253–263 in #23.1.59. Collections of mathematical problems can sometimes be dated by information on the date which is concealed in the problems themselves. The merits of this method of dating are discussed by concrete examples from the 16th and 17th centuries. (JPH) #23.1.149

VAUGHAN, R. C. *See* #23.1.131.

VISOKOLSKIS, SANDRA. Realismo vs Funcionalismo matemático: Una alternativa [Realism vs. Mathematical Functionalism: An Alternative], *Ideas y Valores* **92–93** (December, 1993), 169–175. The author affirms and tries to justify that proofs in mathematics have played such a conditioning role in the analytic–synthetic distinction underlying the original setting of analytical philosophy that any holistic attempt that tries to include mathematics in a true scientific corpus is almost impossible. (VA) #23.1.150

WEYL, HERMANN. Part I. Topology and Abstract Algebra as Two Roads of Mathematical Comprehension, *The American Mathematical Monthly* **102** (1995), 453–462. A translation by Abe Shenitzer of a 1931 lecture delivered by Hermann Weyl. The lecture describes two modes of understanding that illustrate the mutual relation between Riemann's topological theory of algebraic functions and Weierstrass's more algebraic, abstract school of analysis. (DEZ) #23.1.151

WEYL, HERMANN. Part II. Topology and Abstract Algebra as Two Roads of Mathematical Comprehension, *The American Mathematical Monthly* **102** (1995), 646–651. The concluding part of #23.1.151 in which Weyl uses the genus in topology and ideals in algebra to illustrate different kinds of concept building. (DEZ) #23.1.152

WILLIAMS, HUGH C. *See* #23.1.138.

WILSON, ROBIN. *See* #23.1.172.

Xambò-Descamps, S. Francesco Severi and the Principle of Conservation of Number, pp. 255–277 in #23.1.31. Explores the historical development and use of the geometric ''principle of continuity'' or ''principle of conservation of number'' which allowed mathematicians to determine the number of solutions of certain geometrical problems without having to perform the actual underlying construction. The principle is traced from a work of Jean Victor Poncelet in 1822 through the research of Francesco Severi in the opening decades of the 20th century. The ideas of Michel Chasles, H. C. H. Schubert, and Eduard Study are also discussed. The article concludes with a brief discussion of the principle as used in modern work in intersection theory. (KVHP) #23.1.153

Zabell, Sandy L. Alan Turing and the Central Limit Theorem, *The American Mathematical Monthly* **102** (1995), 483–494. An examination of an unpublished paper by Alan Turing on the central limit theorem, written when he was an undergraduate, is discussed in connection with his cryptographic use of statistics during World War II, some of which was recently declassified. (DEZ) #23.1.154

Zalamea, Fernando. Hipótesis del continuo, definibilidad y funciones recursivas: Historia de un desencuentro (1925–1955) [The Continuum Hypothesis, Definability, and Recursive Functions: The History of a Disencounter (1925–1955)], *Mathesis* (*México*) **10** (1994), 187–203. Definability and recursion (with Hilbert, Herbrand, and Gödel) and projective and analytic hierarchies (the Polish school) produced a real disencounter when they met to solve the continuum hypothesis, until Kleene and Addison, following ideas from Mostowski, explained the deep connections between recursion hierarchies and analytic sets, leading to descriptive set theory. (VA) #23.1.155

Zalamea, Fernando. La filosofía de la matemática de Albert Lautman [Albert Lautman's Philosophy of Mathematics], *Mathesis* (*México*) **10** (1994), 273–289. A study of Albert Lautman's idiosyncratic concepts, showing how they are fully realized in what became crucial methodologies of model theory and category theory. Twentieth-century work on the continuum hypothesis allows the author to show ''how a blending of structural insights and Lautman's 'resolution of opposites' can be used to explain some trends in mathematical creativity.'' (VA) #23.1.156

Zappa, Guido. *See* #23.1.35.